

REMARKSA. Request for Reconsideration

Applicant has carefully considered the matters raised by the Examiner in the outstanding Office Action but remains of the position that patentable subject matter is present. Applicant respectfully requests reconsideration of the Examiner's position based on the enclosed Declaration, the amendments to the claims and the following remarks.

B. The Invention

The present invention is directed to methods for forming an ink-jet image, printed matter produced using the methods and recording apparatuses that use the methods. In one of the novel aspects of the invention, the ink-jet method employs a radical polymerization ink in an apparatus that has a quiescent period between the expansion pulse and the shrinkage pulse. In another novel aspect of the invention, the ink-jet method employs a cationic polymerization ink in an apparatus that has a quiescent period between the expansion pulse and the shrinkage pulse. The claimed invention produces images that have superior text quality, color mixing and creasing/curling properties.

C. Claim Status

Claims 1-17 are presented for further prosecution.

Newly added claims 16 and 17 are directed to ink-jet recording apparatuses using the methods of claims 1 or 2. Support for claims 16 and 17 can be found in par. 1 on page 12, and in claims 1 and 2.

D. Claim Objections, Rejections and Amendments

Claims 8 and 9 had been objected to for being dependent upon the incorrect claim. Claims 8 and 9 have been amended to be dependent upon claim 7 as correction.

The Examiner had rejected claims 14 and 15 as indefinite stating that the method limitations do not further define the structure of the apparatus of claims 1 and 2. For the same reasons, claims 14 and 15 had been rejected as being directed to non-statutory subject matter. Applicant has amended the preamble of claims 14 and 15 to refer to the method of claims 1 and 2. It is believed that amended claims 14 and 15 are proper since they further define the methods of claims 1 and 2.

E. Allowable Subject Matter

The subject matter of claims 8 and 9 had been indicated allowable.

F. Claim Rejections under 103(a)

Claims 1-7 and 10-13 had been rejected as being unpatentable over Kerry (US 5,428,350) in view of Yonekubo (US 6,331,040) and Wu (US 6,467,897).

Kerry had been cited to teach an image forming method where droplets of ink are ejected from a plurality of ink chambers which communicate with a common ink tank (col. 2, lines 39-40 and col. 3, lines 17-24). Yonekubo has been cited to teach a driving signal generator with signal maintains the expanded state of the pressure chamber (col. 8, line 66 to col. 9, line 2). Wu has been cited to teach the radical/cationic polymerization inks of claims 1 and 2. The Examiner had taken the position that it would be obvious to employ the driving signal generator of Yonekubo and the ink of Wu in the method of Kerry.

1. It would not be obvious to employ the driving signal generator of Yonekubo and the ink of Wu in the method of Kerry

One of the novel aspects of the present invention is the synergistic combination of the claimed inks in an apparatus that has a quiescent period between the expansion pulse and the shrinkage pulse. Applicant has enclosed test data in Declaration form to demonstrate that this synergistic

combination is surprising and unexpected based on the teachings of the cited references.

Although the Declaration is presently unexecuted, the information contained therein originated with Mr. Ishikawa and is therefore entirely reliable. Applicant respectfully requests consideration of the unexecuted Declaration until an executed copy is provided.

Mr. Ishikawa prepared four inks: Comparative Ink 1, Inventive Ink 2, Inventive Ink 3 and Inventive Ink 4 shown in Tables 1-4 on pages 72-74 of the application. Comparative Ink 1 was not a radical polymerization ink or a cationic polymerization ink as recited in claims 1 or 2. Inventive Ink 2 was a radical polymerization ink of claim 1. Inventive Inks 3 and 4 were both cationic polymerization inks of claim 2. Mr. Ishikawa formed ink-jet images using two control methods: Inventive driving control method 1 (quiescent period of claims 1 and 2) or Comparative driving control method 2 (no quiescent period).

Tests were run using the four inks and the two driving control methods. The ink-jet images produced from these tests were labeled 1-18 and 101-103. Ink-jet images 1-18 and 101-103 were evaluated for text quality, color mixing and creasing/curling as explained in par. 9 of the Declaration. The evaluation results are shown in Tables 6 and B of the

Declaration (Table 6 of the Declaration is identical to Table 6 on page 84 of the application).

When comparing ink-jet images 1-3 (Comparative Ink 1 with Inventive driving control method 1) with ink-jet images 16-18 (Comparative Ink 1 with Comparative driving control method 2), it is seen that the Inventive driving control method does not have a substantial beneficial effect on the image when an ink outside the scope of claims 1 or 2 is used. This comparison therefore demonstrates that a superior image is not produced when the claimed quiescent period is used without the ink of claims 1 or 2.

When comparing ink-jet images 101-103 (Inventive Ink 2 with Comparative driving control method 2) with ink-jet images 4-6 (Inventive Ink 2 with Inventive driving control method 1), it is seen that the Inventive driving control method does have a substantial beneficial effect on the image when an ink within the scope of claim 1 is used. This comparison therefore demonstrates that a superior image is produced when the claimed quiescent period is used with the ink of claim 1.

When comparing ink-jet images 13-15 (Inventive Ink 4 with Comparative driving control method 2) with ink-jet images 10-12 (Inventive Ink 4 with Inventive driving control method 1), it is seen that the Inventive driving control method does have a substantial beneficial effect on the image when an ink within

the scope of claim 2 is used. This comparison therefore demonstrates that a superior image is produced when the claimed quiescent period is used with the ink of claim 2.

In summary, the Declaration demonstrates that a superior image is produced only when the claimed inks are used in combination with the claimed driving control method. Thus, in order to arrive at the claimed invention, one must select the ink of Wu from all known inks and employ that ink with the methods of Kerry and Yonekubo. It is believed that the Declaration demonstrates this combination is not obvious because the ink of Wu in combination with Kerry and Yonekubo is unexpectedly superior to other inks in combination with Kerry and Yonekubo or the ink of Wu in combination with a conventional driving control method.

G. Conclusion

In view of the foregoing and the enclosed, it is respectfully submitted that the application is in condition for allowance and such action is respectfully requested. Should any extensions of time or fees be necessary in order to maintain

this Application in pending condition, appropriate requests are hereby made and authorization is given to debit Account # 02-2275.

Respectfully submitted,

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Encl: Declaration of Mr. Wataru Ishikawa
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